PROCEEDINGS

OF THE

PHYSICAL SOCIETY OF LONDON

From December 1920 *to August* 1921.

VOL. XXXIII.

LONDON:
FLEETWAY PRESS, LTD.,
3-9, DANE STREET, HIGH HOLBORN, W.C. 1.
MDCCCCXXI

LONDON:
PRINTED BY FLEETWAY PRESS, LTD.,
3-9, DANE STREET, HIGH HOLBORN, W.C.1.

CONTENTS.

VOL. XXXIII.

PAGE

X-ray Spectra, Discussion on 1

Ionisation and Excitation of Radiation by Electron Impact in Helium. By FREDERICK S. GOUCHER, Ph.D. 13

The Location of Interference Fringes. By J. GUILD, A.R.C.Sc., D.I.C., F.R.A.S. (Optics Department, National Physical Laboratory) 32

Fringe Systems in Uncompensated Interferometers. By J. GUILD, A.R.C.Sc., D.I.C., F.R.A.S. (Optics Department, National Physical Laboratory) 40

A New Relay for Moderately Heavy Currents. By GUY BARR, B.A., D.Sc. (From the National Physical Laboratory) 53

Some Slide Rule Improvements. By J. ST. VINCENT PLETTS 57

The Current Density in the Crater of the Carbon Arc. By N. A. ALLEN, B.Sc..... 62

A Sodium Vapour Electric Discharge Tube. By F. H. NEWMAN, M.Sc., A.R.C.Sc., University College, Exeter 70

Absorption of Gases in the Electric Discharge Tube. By F. H. NEWMAN, M.Sc., A.R.C.Sc., University College, Exeter 73

Magnetic Separation of Neon Lines and Runge's Rule. By H. NAGAOKA, Professor of Physics, Imperial University of Tokyo 83

A Method of Demonstrating the Retroactive Property of a Triode Oscillator. By E. V. APPLETON, M.A., M.Sc..... 100

The Quickness of Response of Current to Voltage in a Thermionic Tube. By D. OWEN, B.A., D.Sc., and R. M. ARCHER, B.Sc., M.I.E.E., Birkbeck College, London..... 104

On the Mechanical Equilibrium of a Sphere of Gravitating Fluid. By CHARLES H. LEES, D.Sc., F.R.S. (Part of the Presidential Address to the Physical Society, Feb. 13, 1920). (*Continued from Vol. XXXII., p.* 270.)..... 116

PAGE

Discussion on " The Absolute Measurement of Electrical Resistance, and Instruments Based on the Temperature-Variation of Resistance " 125

On Tracing Rays through an Optical System. (Fourth Paper.) By T. SMITH, M.A., F.Inst.P. (From the National Physical Laboratory) 174

On the Refractometry of Prisms. By J. GUILD, A.R.C.Sc., F.Inst.P., F.R.A.S. (From the National Physical Laboratory) 179

A Note on the Hot Wire Inclinometer. By R. H. HUMPHRY, M.Sc. (Birm.) (The Sir John Cass Technical Institute) 190

On the Magnetic Susceptibility of Certain Natural and Artificial Oxides. By Prof. E. F. HERROUN, F.I.C., and Prof. E. WILSON, M.I.C.E., M.I.E.E. 196

A New Registering Microphotometer. By Dr. W. J. H. MOLL, University of Utrecht 207

A Balance Method of Using the Qaudrant Electrometer for the Measurement of Power. By H. PARRY 217

Application of the Ionisation Spectrometer to the Determination of the Structure of Minute Crystals. By Prof. Sir W. H. BRAGG, F.R.S. 222

The Effect of Viscosity on Orifice Flows. By W. N. BOND, B.Sc. (Eng.), M.Sc. (Lond.), A.R.C.S., A.Inst.P. 225

Viscosity of Water at Low Rates of Shear. By A. GRIFFITHS, D.Sc., and C. H. GRIFFITHS, M.Sc. 231

A Method of Measuring Frequencies. By B. S. SMITH and G. F. PARTRIDGE, B.Sc. 243

Note on Vacuum Tubes Used as Detectors of Electrical Oscillations. By L. HARTSHORN, D.I.C., A.R.C.S., B.Sc., and E. S. KEEPING, D.I.C., A.R.C.S., B.Sc. 249

On the Coefficient of Diffusion of Certain Saturated Solutions. By B. W. CLACK, M.Sc. (Lond.), Lecturer in Physics at Birkbeck College 259

Experiments on Thermal Transpiration Currents. By G. D. WEST, D.Sc. (Lond.) 266

PAGE

The Sixth Guthrie Lecture.—Some Recent Applications of Interference Methods. By Prof. A. A. Michelson, University of Chicago 275

A Method for the Micro-Analysis of Gases. (From the Research Laboratory of the General Electric Co.) 287

On the Reflection of the X-ray Spectrum of Palladium from Fluorspar. By H. Pealing, M.Sc..... 297

The Intensity of X-ray Reflection by Diamond. By Prof. Sir W. H. Bragg, K.B.E., M.A., F.R.S..... 304

Capacity and Eddy Current Effects in Inductometers. By S. Butterworth, M.Sc. 312

New Specific Heat Apparatus. By Ezer Griffiths, D.Sc... 355

On Encounters between Non-Spherical Gas Molecules. By Prof. A. O. Rankine, D.Sc..... 362

An Electro-Culture Problem. By C. Chree, Sc.D., LL.D., F.R.S. 377

Demonstration of Acoustical and Optical Experiments. By Prof. C. V. Raman 388

The Stability of Atoms. Lecture by Sir Ernest Rutherford, F.R.S., Cavendish Professor of Physics, Cambridge, and Professor of Natural Philosophy at the Royal Institution 389

Addendum.—Fig. 7 of Paper on A New Registering Microphotometer. By Dr. W. J. H. Moll, University of Utrecht. (*See Vol.* XXXIII., *Part* IV., 1921, *p.* 207).. 395

PROCEEDINGS

AT THE

MEETINGS OF THE PHYSICAL SOCIETY

OF LONDON.

SESSION 1920–1921.

October 25, 1920.

Meeting held at the Institution of Mechanical Engineers, jointly with the Faraday Society.

Sir ROBERT HADFIELD, Bart., F.R.S., in the Chair.

A Joint Discussion was held on "The Physical and Chemical Properties of Colloids, and their Bearing on Industrial Problems."

Prof. Sir W. H. BRAGG, K.B.E., M.A., F.R.S., presided over the Discussion.

November 12, 1920.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. BRAGG, F.R.S., President, in the Chair.

The following Papers were read :—

1. "Ionisation and Excitation of Radiation by Electron Impact in Helium." By F. S. GOUCHER, Ph.D.

2. "Fringe Systems in Uncompensated Interferometers." By GUILD, D.I.C. (From the National Physical Laboratory.)

3. "The Location of Interference Fringes," By J. GUILD, D.I.C. (From the National Physical Laboratory.)

4. "A New Relay for Moderately Heavy Currents." By GUY BARR, D.Sc. (From the National Physical Laboratory.)
The relay of Paper 4 was exhibited in action.

November 26, 1920.

Meeting held at the Imperial College of Science, jointly with the Optical Society.

Chairmen : R. S. WHIPPLE, Esq., and W. R. COOPER, Esq.

A Joint Discussion was held on "The Making of Reflecting Surfaces."

December 10, 1920.

Special General Meeting, held at the Imperial College of Science.

Prof. W. ECCLES, D.Sc., Vice-President, in the Chair.

On a motion from the Chair the following resolutions were passed :—

1. That Article 31 of the Articles of Association, which now reads :—

"The persons whose names are set forth in the second Schedule hereto, other than those whose names are marked ||, shall pay an annual subscription of £2 2s. each,"

be amended by the following addition :—

"Except that the Council shall have the power to authorise a reduction in the subscription of any Fellow who is a member of the Institute of Physics and also a member of one or more other societies which may be co-operating with the Physical Society of London for any common purpose approved by the Council, according to the scale agreed to by all the co-operating societies ; and that a new

Fellow who at the date of his election is already a member of the Institute of Physics and of one of these co-operating societies shall not be required to pay an entrance fee."

2. That Article 33, which now reads :—

"Unless he be transferred from the class of Student, in which case no entrance fee or transfer fee shall be paid, every Fellow hereafter to be elected shall pay an entrance fee of £1 1s., and an annual subscription of £2 2s.,"

be amended to read as follows :—

"Unless he be transferred from the class of Student, in which case no entrance fee or transfer fee shall be paid, every Fellow who is not a Member of the Institute of Physics and also a Member of one of the Societies participating with that Institute, shall pay an entrance fee of £1 1s."

December 10, 1920.

Meeting held at the Imperial College of Science.

Prof. W. Eccles, D.Sc., F.R.S., Vice-President, in the Chair.

The following Papers were read :—

1. "Some Slide Rule Improvements." By J. St. Vincent Pletts.

2. "The Current Density in the Crater of the Carbon Arc." By N. A. Allen, B.Sc.

3. "A Sodium Vapour Electric Discharge Tube." By F. H. Newman, M.Sc., A.R.C.Sc., University College, Exeter.

January 5, 1921.

Special General Meeting held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., President, in the Chair.

On the motion of the President, seconded by Prof. A. W. Porter, the Resolutions passed at the Special General Meeting of December 10, 1920, were unanimously confirmed.

January 5 and 6, 1921.

The Eighth Annual Exhibition of Scientific Apparatus was held in conjunction with the Optical Society.

Discourses were given by—

Sir W. H. Bragg, K.B.E., F.R.S. (January 5), on "Sounds in Nature."

Emeritus Professor Archibald Barr, D.Sc., LL.D. (January 5 and 6), on "The Optophone—an Instrument that Enables the Totally Blind to Read Ordinary Print," with demonstration by a blind person.

Prof. C. R. Darling, F.I.C. (January 6), on "Some Unusual Surface Tension Phenomena."

January 28, 1921.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., in the Chair.

The following Papers were read :—

1. "Magnetic Separation of the Neon Lines and Runge's Rule." By Prof. H. Nagaoka, University of Tokyo.

2. "A Method of Demonstrating the Retro-active Property of a Triode Oscillator." By E. V. Appleton, M.A., B.Sc., R.E.

3. "The Quickness of Response of Current to Voltage in a Thermionic Tube." By D. Owen, B.A., D.Sc., and R. M. Archer, B.Sc., M.I.E.E.

February 11, 1921.

Annual General Meeting.

Held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., President, in the Chair.

A discussion was held on "Absolute Measurements of Electrical Resistance, and Instruments based on the Temperature-variation of Resistance."

GENERAL BUSINESS.

The Report of the Council was read by the Secretary, Mr. F. E. Smith, O.B.E., F.R.S., and the Report of the Treasurer was read by the Treasurer, Mr. W. R. Cooper, M.A., B.Sc. Both Reports were unanimously adopted.

Report of the Council.

In the year 1920, 14 ordinary Science Meetings and one Special General Meeting of the Society were held. Of these the Special General Meeting and 12 ordinary meetings were held at the Imperial College of Science; one ordinary meeting, by invitation of Professor Eccles, was held at the City and Guilds Technical College, Finsbury; and a joint meeting with the Faraday Society was held at the Institution of Mechanical Engineers.

Four of the ordinary meetings were devoted to discussions. One on Relativity was opened by Professor Eddington, F.R.S.; the second on X-Ray Spectra was opened by the President, Professor Sir W. H. Bragg; the third was in co-operation with the Faraday Society and dealt with Colloids, and the fourth was a joint meeting with the Optical Society, the subject being "The Making of Reflecting Surfaces." Each of these meetings was attended by over 100 Fellows and visitors, the average attendance being about 160.

The Guthrie Lecture was delivered on April 23rd, by Dr. Guillaume, who chose as his subject "The Anomaly of the Nickel Iron Alloys: its Causes and its Application." The lecture was attended by 114 Fellows and visitors. Subsequently the Council had the pleasure of congratulating Dr. Guillaume on the occasion of the award to him of the Nobel Prize for Physical Research.

Excluding the Discussions and the Guthrie Lecture the average attendance at the ordinary meetings was 63.

In co-operation with the Optical Society the Annual Exhibition of Apparatus was held on January 4th and 5th. About 40 firms exhibited and over 2,000 Fellows and visitors attended. A number of captured German instruments were exhibited by the Air Ministry and the Admiralty Compass Department. Professor F. J. Cheshire gave two lectures on "Some Polarisation Experiments," and Professor Rankine gave two lectures on "The use of Light in the Transmission and Reproduction of Speech." The lectures were attended by large audiences.

A sub-committee appointed to consider the award for distinguished research of a gold medal, to be known as the Duddell Memorial medal, reported in favour of such a project. A special fund, known as the Duddell Memorial Fund, has been raised by voluntary contributions, and it is hoped to proceed shortly with the preparation of the medal and to circulate particulars of the scheme.

A Report on Atomic Structure by Professor Bohr is in preparation.

At a Special General Meeting held on December 10th, 1920, the following resolutions were submitted and carried *nem con.*

1. That Article 31 of the Articles of Association which now reads :

> " The persons whose names are set forth in the second Schedule hereto, other than those whose names are marked shall pay an annual subscription of £2 2s. each,"

be amended by the following addition :

> " Except that the Council shall have the power to authorise a reduction in the subscription of any Fellow, who is a member of the Institute of Physics and also a member of one or more other societies which may be co-operating with the Physical Society of London for any common purpose approved by the Council, according to the scale agreed to by all the co-operating societies ; and that a new Fellow who at the date of his election is already a member of the Institute of Physics and one of these co-operating societies shall not be required to pay an entrance fee."

2. That Article 33, which now reads :

> " Unless he be transferred from the class of Student, in which case no entrance fee or transfer fee shall be paid, every Fellow hereafter to be elected shall pay an entrance fee of £1 1s., and an annual subscription of £2 2s.,"

be amended to read as follows :

> Unless he be transferred from the class of Student, in which case no entrance fee or transfer fee shall be paid, every Fellow who is not a Member of the Institute of Physics and also a Member of one of the Societies participating with that Institute, shall pay an entrance fee of £1 1s.

The number of Honorary Fellows on the Roll on December 31st, 1920, was nine, and the number of Ordinary Fellows and Students was 507.

Thirty-three new Fellows and one Student were elected during the year.

The Society has to record with regret the deaths of Professor Righi, Sir Norman Lockyer, Sir William Abney and Professor Perry. Professor Righi was an Honorary Fellow of the Society from 1903, and Sir William Abney and Professor Perry were past Presidents of the Society.

Report of the Treasurer.

From the financial point of view, the past year has been somewhat critical owing to the increasingly high cost of printing. Fortunately there has been a substantial increase in the revenue, the total income being £1,513 2s. 8d., as against £1,261 2s. 7d. for the previous year. This is partly due to the larger membership, but mainly to the much increased sale of publications, amounting to £436 15s. 4d., as compared with £280 16s. 10d. for the previous year.

FROM JANUARY 1ST TO DECEMBER 31ST, 1920.

INCOME.	£	s.	d.	£	s.	d.
Entrance Fees	30	9	0			
Subscriptions by Fellows	598	16	0			
" Voluntary	15	15	0			
" by Students	6	6	0			
" Arrears paid	94	2	0			
" Paid in Advance	17	15	0			
" for "Science Abstracts" and Advance Proofs	24	7	6			
				787	10	6
Composition Fees				63	0	0
Dividends :—						
Furness Debenture Stock	11	3	10			
Midland Railway	28	0	0			
Metropolitan Board of Works	7	0	0			
Lancaster Corporation Stock	8	8	0			
New South Wales Stock	8	17	10			
London, Brighton & South Coast Railway	18	7	6			
Great Eastern Railway	14	0	0			
India 3½% Stock	17	10	0			
Funding Loan	18	4	0			
				131	11	2
Income Tax refunded				34	5	6
Interest on deposit account				20	3	8
Sales of Publications (Fleetway Press, Ltd.)				436	15	4
Optical Society (for Exhibition)				39	16	6
				£1,513	2	8

EXPENDITURE.	£	s.	d.	£	s.	d.
"Science Abstracts"	287	12	0			
" " Extra copies	5	11	6			
				293	3	6
Fleetway Press, Ltd. :—						
"Proceedings"	580	15	9			
Bulletin	68	14	0			
Distribution (Postage)	58	7	3			
General	135	18	3			
				843	15	3
Periodicals	2	14	0			
International Catalogue	11	12	4			
Reporting	56	5	6			
Refreshments and Attendance	92	0	11			
Petty Cash—						
Secretaries' Expenses	20	16	8			
Treasurer's Expenses	16	1	7			
Guthrie Lecture (Honorarium)	10	0	0			
Insurance	3	2	6			
F. S. Spiers (registered address)	2	2	0			
Bank Charges		7	4			
Cheque Book		10	0			
				215	12	10
Donations—						
Conjoint Board of Scientific Societies	10	0	0			
Watt Memorial	10	10	0			
				20	10	0
Total Expenditure for the Year				1,373	1	7
Balance, being excess of income over expenditure				140	1	1
				£1,513	2	8

W. R. COOPER, *Honorary Treasurer.*

Audited and found correct,

G. W. O. HOWE,
ROBERT S. WHIPPLE, } *Honorary Auditors.*

February 8th, 1921.

BALANCE SHEET AT DECEMBER 31ST, 1920.

ASSETS.

	£ s. d.	£ s. d.
Subscriptions in arrears	80 6 6	
Less reserve for subscriptions probably unrealisable	30 0 0	
		50 6 6
Investments (valued at Dec. 31):—		
£533 Furness 3 per cent. Debenture Stock	250 0 0	
£1,600 Midland Railway 2½ per cent. Perpetual Preference Stock	612 0 0	
£200 Metropolitan Board of Works 3½ per cent. Consolidated Stock	160 0 0	
£400 Lancaster Corporation 3 per cent. Redeemable Stock	196 0 0	
£254 2s. 9d. New South Wales 3½ per cent. Ordinary Stock	219 0 0	
£500 London, Brighton & South Coast Railway Ordinary Stock	250 0 0	
£500 Great Eastern Railway 4 per cent. Debenture Stock	310 0 0	
£500 India 3½ per cent. Stock	270 0 0	
£650 4% Funding Loan, 1960-90	435 0 0	
		2,702 0 0
Stock of Publications (Treasurer's valuation)		400 0 0
Cash at Bank on Deposit		300 0 0
Cash at Bank, Current Account at Dec. 31	90 17 10	
Adjustment for outstanding cheques	16 15 5	
		107 13 3
Cash in hand (Treasurer's Petty Cash)		1 3 10
		£3,561 3 7

W. R. COOPER, *Honorary Treasurer.*

February 8th, 1921.

LIABILITIES.

	£ s d.
Life Compositions	1,938 10 0
Balance, General Fund	1,622 13 7
	£3,561 3 7

Audited and found correct,

G. W. O. HOWE,
ROBERT S. WHIPPLE, } *Honorary Auditors.*

LIFE COMPOSITION FUND AT DECEMBER 31ST, 1920.

		£	s.	d.
140	Fellows paid £10	1,400	0	0
3	Fellows paid £15	45	0	0
10	Fellows paid £21	210	0	0
9	Fellows paid £31 10s.	283	10	0
162		£1,938	10	0

W. R. COOPER, *Honorary Treasurer.*

February 8th, 1921.

Audited and found correct,

G. W. O. HOWE,
ROBERT S. WHIPPLE, } *Honorary Auditors.*

During the past year the Annual Exhibition was resumed, jointly with the Optical Society. This involved a considerable expense, both in refreshments and printing, which was shared by the two Societies. The main increase in expenditure, however, was due to the ever rising cost of printing the publications. The expenditure for the year has thus risen to £1,373 1s. 7d., as compared with £987 6s. 8d. for the previous year, but fortunately the increase in revenue has resulted in a credit balance of £140 12s. 1d. for the year. If the normal activities of the Society are to be maintained there is no doubt that the expenditure must rise still further, but it is hoped that the revenue from the publications (the price of which has now been raised by 50 per cent.) will also increase sufficiently to meet the needs of the case.

The Balance Sheet shows that the position in regard to arrears of subscriptions is much more satisfactory than it was last year. The figure included for the stock of publications has been increased from £250 to £400 as their value is certainly materially greater than it was a few years ago, and their price has now been raised.

The investments, as in previous years, have been valued at market prices through the courtesy of the London County, Westminster & Parr's Bank. They show a further considerable depreciation in value. No further investment has been made, although some life compositions have been received, as it seemed preferable at the moment to retain these fees in the deposit account at the Bank. The cash thus on deposit at December 31st has increased by £50.

On the whole it may be said that the financial position of the Society is much more satisfactory than might have been expected, considering the difficult times through which most of the scientific societies are at present passing.

Election of Officers and Council.

The election of Officers and Council for the ensuing year resulted as follows :—

President.—Prof. Sir W. H. Bragg, K.B.E., M.A., F.R.S.

Vice-Presidents, who have filled the office of President.—C. Chree, Sc.D., LL.D., F.R.S. ; Prof. H. L. Callendar, M.A., LL.D., F.R.S. ; Prof. R. B. Clifton, M.A., F.R.S. ; Sir Richard Glazebrook, K.C.B., D.Sc., F.R.S. ; Sir Oliver J. Lodge, D.Sc., F.R.S. ; Prof. C. H. Lees, D.Sc., F.R.S. ; Prof. A. W. Reinold, M.A., F.R.S. ; Sir Arthur Schuster, Ph.D., Sc.D., F.R.S. ; Sir J. J. Thomson, O.M., D.Sc., F.R.S. ; Prof. C. Vernon Boys, F.R.S.

Vice-Presidents.—Prof. W. Eccles, D.Sc. ; Prof. A. S. Eddington, M.A., M.Sc., F.R.S. ; The Rt. Hon. Lord Rayleigh, F.R.S. ; Prof. Sir Ernest Rutherford, D.Sc., F.R.S.

Secretaries.—F. E. Smith, O.B.E., F.R.S., National Physical Laboratory, Teddington ; D. Owen, B.A., D.Sc., 62, Wellington Road, Enfield, Middlesex.

Foreign Secretary.—Sir Arthur Schuster, Ph.D., Sc.D., F.R.S.

Treasurer.—W. R. Cooper, M.A., B.Sc., 82, Victoria Street, S.W.1.

Librarian.—Prof. A. O. Rankine, D.Sc., Imperial College of Science and Technology.

Other Members of Council.—G. B. Bryan, D.Sc. ; C. R. Darling, F.I.C. ; Prof. C. L. Fortescue, O.B.E. ; E. Griffiths, D.Sc. ; F. L. Hopwood, D.Sc. ; E. H. Rayner, M.A., D.Sc. ; A. Russell, M.A., D.Sc. ; T. Smith, B.A. ; J. H. Vincent., D.Sc., M.A. ; Prof. W. B. Morton, M.A.

On the motions of Dr. Chree, Mr. Clack and Dr. Thomas, respectively, seconded by Mr. Lister, Dr. Borns, and Mr. Paul, respectively, votes of thanks to the Honorary Auditors, to the Officers and Council, and to the Governing Body of the Imperial College of Science, were unanimously passed.

February 25, 1921.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., President, in the Chair.

The following Papers were read :—

1. "On Tracing Rays through an Optical System." By T. Smith, B.A.

2. "On the Refractometry of Prisms." By J. Guild, A.R.C.Sc.

3. "A Note on the Hot Wire Inclinometer." By R. H. Humphry, M.Sc.

4. "The Magnetic Susceptibility of Certain Natural and Artificial Oxides." By Prof. E. F. Herroun, F.I.C., and Prof. E. Wilson, M.I.C.E., M.I.E.E.

March 11, 1921.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., in the Chair.

The Sixth Guthrie Lecture was delivered by Prof. A. A. Michelson, University of Chicago ; *subject*—

" Some Recent Applications of Interference Methods."

April 8, 1921.

Meeting held at the Imperial College of Science.

Mr. W. R. Cooper, M.A., B.Sc., Treasurer, in the Chair.

The following Papers were read :—

1. " A New Registering Microphotometer." By Dr. W. J. H. Moll, University of Utrecht.

2. " Application of the Ionisation Spectrometer to the Determination of the Structure of Minute Crystals." By Prof. Sir W. H. Bragg, K.B.E., F.R.S.

3. " A Balance Method of Using the Electrometer for the Measurement of Power." By Mr. Hubert Parry.

April 22, 1921.

Meeting held at the Imperial College of Science.

Prof. W. Eccles, D.Sc., F.R.S., Vice-President, in the Chair.

The following Papers were read :—

1. " The Effect of Viscosity on Orifice Flows." By Mr. W. N. Bond, M.Sc.

2. " The Viscosity of Water at Low Rates of Shear." By A. Griffiths, D.Sc., and Constance H. Griffiths, M.Sc.

3. " A Method of Measuring Frequencies." By B. S. Smith, and G. F. Partridge, B.Sc.

May 13, 1921.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., President, in the Chair.

The following Papers were read :—

1. "Notes on Vacuum Tubes used as Detectors of Electrical Oscillations." By L. Hartshorn, A.R.C.Sc., D.I.C., and E. S. Keeping, A.R.C.Sc., D.I.C.

2. "On the Coefficient of Diffusion of Certain Saturated Solutions." By B. W. Clack, M.Sc.

3. "Experiments on Thermal Transpiration Currents." By G. D. West, D.Sc.

May 27, 1921.

Meeting held at University College, London.

Prof. Sir W. H. Bragg, K.B.E., F.R.S., President, in the Chair.

The following Papers were read :—

1. "A Method for the Micro-Analysis of Gases." From the Research Laboratory of the General Electric Co.

2. "On the Reflection of the X-ray Spectrum of Palladium from Fluorspar." By H. Pealing, M.Sc.

3. "The Intensity of the X-ray Reflection by Diamond." By Sir W. H. Bragg, F.R.S.

Sir William Bragg exhibited and explained photographs by M. le Duc de Broglie of the "Magnetic Spectra" obtained if the β-rays produced when X-rays strike copper be deflected on to a photographic plate by a magnetic field.

June 10, 1921.

Meeting held at the Imperial College of Science.

Dr. C. CHREE, F.R.S., Vice-President, in the Chair.

A Lecture on " The Stability of Atoms " was delivered by Prof. Sir ERNEST RUTHERFORD, F.R.S.

June 24, 1921.

Meeting held at the Imperial College of Science.

Prof. Sir W. H. BRAGG, K.B.E., F.R.S., President, in the Chair.

The following Papers were read :—

1. " Capacity and Eddy Current Effects in Inductometers." By S. BUTTERWORTH, M.Sc.

2. " New Specific Heat Apparatus." By Dr. EZER GRIFFITHS.

3. " On Encounters between Non-spherical Gas Molecules." By Prof. A. O. RANKINE.

4. " An Electro-Culture Problem." By Dr. C. CHREE, F.R.S.

A demonstration of experiments in Acoustics and Optics was given by Prof. C. V. RAMAN, of Calcutta.